been established between leaf and fruit characters (Table 3). Correlation coefficient was highest with respect to breadth and lowest in case of shape index.

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JODHPUR,
June 18, 1986.

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36. ADDITIONAL REPORTS OF THE ASTERACEAE FOR PUNJAB STATE

Nair (1978), in his most recent and comprehensive work dealing with the Punjab plants, has recorded 62 wild and 6 cultivated species of the Asteraceae. Subsequently, Daniel (1982) reported *Glossocardia bosvallea* (Linn. f.) DC. from Garhimanswal (Dist. Hoshiarpur). Based upon the plant explorations of Punjab for seventeen years (1963-1979), I enumerated another 16 wild (Sharma 1982a) and 41 cultivated species (Sharma 1982b) of the Compositae from Punjab State. Further collections and observations for six years (1980-1985) from the unexplored and underexplored Shivaliks and submountainous zone of this area have resulted in the recording of another 8 species listed below alphabetically with some relevant observations and annotations. All the specimens cited here are deposited in Herbarium Punjabi University, Patiala (PUN).

1. **Adenostemma lavenia** (Linn.) O. Kuntze, Rev. Gen. Pl. 1 : 304. 1891; Raizada, Suppl. Fl. Upp. Gang. Plain 100. 1976; Babu, Herb. Fl. Dehra Dun 237. 1977. *Verbesina lavenia* Linn. Sp. Pl. 902. 1753. *Adenostemma viscosum* J. G. Forst. Char. Gen. Pl. 90. 1776; Hook. f. Fl. Brit. Ind. 3: 242. 1881, *pro parte.*

Occasionally met with in marshes on the northern side of the State particularly towards Shivaliks. This species is characterized by 1-1.5 mm long corolla, 5-6 mm long heads, 3-4 mm long involucre and tuberculate achenes. Hooker (loc. cit.) had described seven varieties under *A. viscosum.* Plants from our area are referable to var. *parviflorum* (Bl.) Hook. f. However, Hooker (loc. cit.) reduced *A. micro-*

phyllum (Bl.) DC. to the synonymy of this variety. Priestly, *A. microphyllum* is treated as a distinct species (Raizada, Babu loc cit.). It has larger corolla (2.5-3 mm long), heads (8-10 mm long), involucre (5-6 mm long) and smooth achenes in contrast to those of *A. lavenia.*

Fl. & Fr.: September-November.

Specimens examined: Chamkaur Sahib Ropar Headworks, Amritsar; *M. Sharma* 10433, 10487, 11740.

2. **Bidens bipinnata** Linn. Sp. Pl. 832. 1753; Sherff, Field. Mus. Nat. Hist. Bot. 16: 366. 1937; Dakshini & Singh, Proc. Ind. Acad. Sci. (Pl. Sci.) 93: 175. 1984.

Common locally in shady waste lands towards Shivaliks.

Fl. & Fr.: July-November.

Specimens examined: Morinda, Bela; *M. Sharma* 10461, 10484.

3. **Coreopsis basalis** (A. Dietr.) Blake, Proc. Amer. Acad. 2: 525. 1916; Bailey, Man. Cult. Pl. 1003. 1949. *Calliopsis basalis* A. Dietr. in Otto & Dietr. Allgem. Gartenz. 3: 330. 1835

A native of North America. Commonly cultivated, often found as an escape near gardens.

Fl. & Fr.: February-April.

Specimens examined: Univ. Campus, Patiala; *M. Sharma* 819, 883.

4. **Coreopsis lanceolata** Linn. Sp. Pl. 908. 1753; Bailey, Stand. Cycl. Hort. 1: 845. f. 1056. 1928; Man. Cult. Pl. 1003. 1949; Vishnu Swarup, Garden Fl. 146. 1967.

A native of North America. Commonly grown as a garden ornamental. Occasionally also found as a self-sown near gardens.

Fl. & Fr.: February-April.

Specimens examined: Univ. Campus, Patiala, *M. Sharma* 11738.

5. **Filago pyramidata** Linn. Sp. Pl. 1199. 1753; Stewart, in Nasir & Ali, Fl. W. Pak. 747. 1972; Holub in Davis, Fl. Turkey 5: 104. 1975; in Tutin *et al.* Fl. Europ. 4: 122. 1976. *F. spathulata* Presl, Delic. Prag. 99. 1822; Nair, Fl. Bashahr Himal. 152. 1977. *F. germanica auct.* non Linn.; Hook. f. Fl. Brit. Ind. 3: 277. 1881.

Common in sandy areas along the foot-hill zone of the State. In Indian taxonomic literature, this species has often been described under the name *F. germanica* Linn. (correct name *F. vulgaris* Lam.) which is characterized by linear — lanceolate to lanceolate leaves and heads in clusters of 20-40. In the present taxon, the leaves are obovate-oblong or spathulate and heads in clusters of 5-20.

Fl. & Fr.: March-May.

Specimens examined: Samana, Bhankarpur, Ropar, Nangal, Nurpur Bedi; *M. Sharma* 3249, 3518, 5653, 8503, 10428.

6. **Siegesbeckia orientalis** Linn. Sp. Pl. 900. 1753; Hook. f. Fl. Brit. Ind. 3: 303. 1881.

This species has been observed in the submountainous zone of the State and appears to be a recent introduction from the hills where it grows in W. Himalayas up to an altitude of 1,800 m. The plant is recognized easily because of its sticky, glandular involucral bracts.

Fl. & Fr.: August-November.

Specimens examined: Nangal, *M. Sharma* 10325.

7. **Silybum marianum** (Linn.) Gaertn. Fruct. Sem. 2: 378. t. 168. 1791; Hook. f. Fl. Brit. Ind. 3: 365. 1881. *Cardus marianus* Linn. Sp. Pl. 823. 1753.

Common in and around Pathankot and elsewhere in Dist. Gurdaspur in waste land. This thistle-like herb is easily recognized because of

its crispy, spinescently dentate leaves with broad pale midrib and 4-5 cm long heads surrounded by prominently spine-tipped involucral bracts.

Fl. & Fr.: March-May.

Specimens examined: Pathankot, *M. Sharma* 13598.

8. **Ursinia anethoides** (DC.) N. E. Br. Gard. Chron. 1: 670. 1887; Bailey, Man. Cult. Pl. 1013. 1949; Vishnu Swarup, Garden Fl. 133. 1967. *Sphenogyne anethoides* DC. Prodr. 5: 685. 1836.

A native of South Africa. Often grown in gardens.

Fl. & Fr.: February-April.

Specimens examined: Univ. Campus Patiala, *M. Sharma* 11737.

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37. LIMNOLOGICAL INVESTIGATION IN THE BACK-WATER LAGOON OF GOPALPUR-ON-SEA

(*With two text-figures*)

INTRODUCTION

Around 2 Km² area of Gopalpur-on-Sea is periodically flooded by sea water through a back-water-lagoon. Since the sewage and municipal canals are directed to this low-lying back-water lagoon, it is often rich with various nutrients that encourages growth of various organisms. Although a limited amount of floristic work dealing with algae had been made in the past (Pattnaik *et al.* 1979) attention had not been given to study the limnological aspects of the habitat. The present investigation was carried out to study the water quality, variation in the quantity and quality of phytoplankton during different seasons and the